

Critical and Creative Thinking, Reasoning, and Solution Seeking

SFUSD 21st Century Learning Toolkits

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Critical and Creative Thinking, Reasoning, and Solution Seeking

Brief description

New global realities are rapidly working their way into the deepest structures of our lives: economic, social, cultural, political, and environmental realities — realities with profound implications for thinking and learning, business and politics, human rights and human conflicts. We cannot deal with incessant and accelerating change and complexity without revolutionizing our thinking. (*Darling-Hammond, L., 2010, in The Flat World and Education*, p. 278)

Working Definition

Definition	Guiding Questions	Criteria
Critical and creative thinking, reasoning, and solution seeking: Students demonstrate skills that help them acquire knowledge and comprehend, apply, analyze, synthesize, evaluate, create, and think dialectically and meta-cognitively about data and issues.	<ul style="list-style-type: none">Did students' coursework encourage complex thinking, reasoning, and meta-cognition together with application of knowledge to real world contexts and critical analysis of social issues?	Does the student demonstrate: <ul style="list-style-type: none">critical thinking, creativity, and real-world solution-seeking in coursework in English, math, history/social science, lab science, and the visual and performing arts?

Voices from the field

The problems we now face, and will increasingly face, require a radically different form of thinking, thinking that is more complex, more adaptable, more sensitive to divergent points of view. ...there is a new world facing us, one in which the power of the mind to command itself, to regularly engage in self-analysis, will increasingly determine the quality of our work, the quality of our lives, and perhaps even, our very survival. (*Linda Darling-Hammond, 2010, in The Flat World and Education*, p. 278)

What we have before us are some breathtaking opportunities disguised as insoluble problems. (*John W. Gardner, Former Secretary of the U.S. Department of Health, Education, and Welfare*)

Now, more than ever, the United States is competing in a global economy that demands innovation. President Obama noted this in his State of the Union... To build a strong economy, we must ensure young people are prepared to succeed both in the jobs of today and those that haven't been created yet. We can do this by fusing the three Rs and the four Cs: critical thinking... collaboration, communication and creativity... (*Partnership for 21st Century Skills, 2010, http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=883&Itemid=64*)

The trajectory of world events suggests that educated people should be far better able than before to address the great issues courageously and analytically by undertaking a traverse of disciplines. We are into the age of synthesis, with a real empirical bite to it. Therefore, *sapere aude*. Dare to think on your own. (*E. O. Wilson, Biologist, 2006*)

He who learns but does not think, is lost. He who thinks but does not learn is in great danger. (*Chinese Proverb*)

There definitely has to be a shift in education where more analytical skills [are taught]... Whether or not you memorize is no longer important because anybody can memorize things. Anybody can Google stuff and look it up. So now it's a matter of being able to understand the information that's being taught so that you can learn to process it in your brain, and this is of more benefit than just memorizing something and spitting it right back out. (*High school student, <http://ali.apple.com/acot2/skills/> Clip 49*)

Human creativity is the ultimate economic resource. (*Richard Florida, 2002, in The Rise of the Creative Class.*)

Creativity is a central source of meaning in our lives... most of the things that are interesting, important, and human are the results of creativity... and when we are involved in it, we feel that we are living more fully than during the rest of life. (*Mihaly Csikszentmihalyi, Professor of Psychology*)

Although most people might look for signs of creativity in the appearance of the bulletin boards, student made projects, centers and displays in the classroom. I feel the truly creative classroom goes way beyond what can be seen with the eyes. It is a place where bodies and minds actively pursue new knowledge. Having a creative classroom means that the teacher takes risks on a daily basis and encourages his/her students to do the same. (*Baltz, P., Teacher, <http://pzweb.harvard.edu/Research/CrClass.htm>*)

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Equity Lens

In an interconnected global society, youth need to be able to critique inequalities and understand the dynamics of power and privilege in relation to their own lives. Critical thinking gives young people an awareness of multiple perspectives and helps them analyze divergent views on current and historical events... Critical thinking allows youth to become fully engaged citizens in society. (*California Tomorrow, Bridging Multiple Worlds*, p. 6)

Questions to consider in planning for critical and creative thinking, reasoning, & solution-seeking:

a. Do all students have access?

- Are all students, regardless of learning styles, achievement levels, race/ethnic origin, socioeconomic status, or home language, seen as bringing critical and creative thinking skills that can be built upon, and encouraged by their teachers to develop strong reasoning and deep critical and analytical skills?
- Are creative and critical thinking skills developed in every content area, including vocational education? Does every class focus on genuine intellectual content, include real-world applications, and invite genuine thinking? (Noddings)
- Are all students, including underperforming/underachieving students, encouraged to find their element, identify their passions, and express themselves in creative ways? (Robinson)
- To what extent are all students visibly engaged in intellectual activities that tap into their personal learning styles? To what extent are all students making use of higher order thinking and metacognitive skills to manage their own learning? (LAUSD *Culturally Relevant & Responsive Education CRRE Quality Indicators*)
- To what extent do students make positive connections to creative and critical thinkers from their backgrounds, set goals for their own effort, and learn to see themselves as scholars? (LAUSD CRRE Quality Indicators)

b. What strategies are in place to meet students' diverse needs as they develop skills in critical and creative thinking, reasoning, and solution-seeking?

How can the school/classroom become an intellectual learning community where educators and students of all backgrounds actively engage in creative thinking, questioning, analyzing, and solution-seeking?

- To what extent is the school climate created for intellectual engagement and curiosity?
- Do teachers help all students, including ELs, learn the linguistic tools for abstract thinking and acquire a wide range of cognitive terms to effectively think and communicate in different disciplines? (Zwiers)
- Are teachers able to preserve creativity and protect individual passions in all students? (Zhao)
- To what extent is instruction organized (with a balance between task difficulty level and the interests and abilities of the individual) to optimize the "creative flow" for each student? (Csikszentmihalyi)
- Is there a climate of trust and exploration? Do students have a sense that they can take risks?
- Do teachers model metacognitive skills and make thinking visible - externalizing thoughts through speaking, writing, drawing, or other methods to improve the thoughts, or document thinking for later reflection? (Ritchart & Perkins)
- Are students in all subject areas at all levels treated as thinking intellectuals (as mathematicians, scientists, artists, historians, etc.) and encouraged to use thinking skills pertinent to that discipline (e.g. scientific method, etc.)?
- To what extent do teachers think critically and creatively? Do all teachers ask: What are the underlying causes for non-critical thinking? What relationships and conditions in the schools and classrooms have contributed to why children are not deeper critical thinkers? What underlying assumptions and values drive the existing school cultures? How can systemic change be implemented?

c. Are students developing the ability to use their critical and creative thinking skills to create a more just and inclusive world?

- Do teachers promote "thinking big" and applying deep, creative thinking to world situations and problems? (Costa)
- To what extent do students learn to deal with complex problems and become well-versed in issues that affect their communities, their nation, and their world? (Robinson)
- To what extent are students guided in identifying the traditional intellectual strengths, in terms of education, culture, and economy, in their community? (Zhao)
- Do schools help students develop an ethical mind i.e. develop high levels of abstraction, conceptualize themselves as good workers and good citizens, and act appropriately in both roles in school/community settings? (Gardner)
- Do students understand the many forms that intelligence takes in a democracy, including the intellectual content of everyday work (e.g. competence to handle complex issues and problems that require abstract knowledge and analytical ability)? (Rose)
- Do students engage in collaborative critical inquiry and problem-solving with their peers around the world? (Cummins)
- To what extent are students guided not just in problem-solving but also in dialogue and problem-posing? (Freire)
- To what extent do students develop consciousness, increased self-reflection, and increased reflection about status, power, wealth and privilege in society? (Baker)

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Readings

1. All Our Students Thinking

Noddings, N. (Summer 2008) All Our Students Thinking, *Educational Leadership*, 65 (10) 8-13

http://www.ascd.org/publications/educational_leadership/summer08/vol65/num10/All_Our_Students_Thinking.aspx

Summary: Nel Noddings, Stanford professor emeritus, believes that any subject—be it physics, art, or auto repair—can promote critical thinking as long as students are engaged and teachers teach in intellectually challenging ways. Teachers can motivate students as thinkers through inquiry learning and by modeling for students their own thinking processes.

Questions for discussion: (Some are based on questions from the EL study guide by Naomi Thiers)

- a) Do you agree that some subjects—such as algebra and philosophy—spur deep thinking more than others—such as French or business administration? Or can any subject engender critical thinking if taught well & studied passionately?
- b) What makes a course challenging in terms of thinking: the amount of content included? The fact that the course is college-prep? Or some other factor?
- c) What approaches have you found to be effective in teaching in intellectually challenging ways, ensuring that students are engaged, and deepening students' intellectual habits of mind?
- d) As you consider SFUSD's goal to ensure that all students are college- and career-ready, what ideas do you have to better prepare all students for democratic citizenship and the intellectual demands of the future?

2. Thought-filled Curriculum

Costa, A. (Feb. 2008) The Thought-filled Curriculum. *Educational Leadership*, 65 (5) 20-24

http://www.ascd.org/publications/educational_leadership/feb08/vol65/num05/toc.aspx Also available at:

https://its-csnap01.dcsdk12.org/cia_resources/thinking_files/The%20Thought-filled%20Curriculum.pdf.

Summary: Teachers need to continually examine and evaluate their curricular choices to be certain they are giving students practice in thinking with depth; engaging students in authentic, relevant activities that will stimulate deep thinking about content; showing students how to study their own thinking; guiding learners in thinking within groups; and promoting "thinking big" in terms of applying deep, creative thinking to world situations and problems.

Questions for discussion:

- a) Consider a lesson that you have done or would like to do with students at your grade level. What changes could you make to further develop students' critical thinking skills. Share your thoughts with a colleague.
- b) Consider one of the content areas that you teach. What specific critical thinking skills are associated with that content area? What are some examples of questions for students that you feel stimulate deep thinking about that discipline?
- c) What approaches have you used to "show students how to study their own thinking"? What opportunities have you found to model metacognitive skills in your own teaching?

3. Why Creativity Now? (17 minute video or transcript of interview)

Azzam, A. Why Creativity Now? A Conversation with Sir Ken Robinson (2009) *Educational Leadership*, 67 (1) 22-26

http://www.ascd.org/publications/educational_leadership/sept09/vol67/num01/Why_Creativity_Now_A_Conversation_with_Sir_Ken_Robinson.aspx (For other related videos by Robinson, see section on Resources)

Summary: Creativity expert Sir Ken Robinson makes the case for creativity as a crucial 21st-century skill. Creative processes involve critical thinking as well as imaginative insights and fresh ideas. Creativity and innovation are structured and disciplined and can help us tackle current challenges and reconnect us with our passions. Instead of "systematically alienating people from their own talents," schools need to teach creatively and teach for creativity.

Questions for discussion: (Some are based on questions from the EL study guide by Naomi Thiers)

Consider Robinson's words on how our current system squelches students' creative spirits. Robinson claims that too often schools are systematically alienating people from their own talents and, therefore, from the whole process of education. "We know this because human culture is so diverse and rich—and our education system is becoming increasingly dreary and monotonous. ...It's no surprise to me that so many kids are pulling out of it." (p. 25)

- a) Imagine a visitor from outer space dropped into your school on a typical day, and judged human culture only from observing in various classrooms for a few hours. How much of the richness and diversity of human culture would this visitor see? What rich elements of human life might *not* be displayed?
- b) What do you think of Robinson's suggestion that many students drop out because they find their interests and imagination aren't welcome in the typical school environment? Think of a former student who dropped out, consider how that student interacted in your class, and try to imagine what caused that student to leave school early. Do you think this learner perceived that only a narrow set of talents or way of learning was accepted?
- c) What are some ways in which you develop and nurture your own creativity? What ideas do you have "to teach creatively" and "teach for creativity" in your own classroom? What relationship do you see between the two?
- d) Can we have both standards and individual creativity? Explain your thinking.

Critical and Creative Thinking, Reasoning, and Solution Seeking Resources

1. Educational Leadership (EL) Special Issues on Teaching Thinking [research-based principles, strategies, examples]

a. **Teaching Students to Think** (Feb. 2008). *Educational Leadership* 65 (5)

http://www.ascd.org/publications/educational_leadership/feb08/vol65/num05/toc.aspx

b. **Thinking Skills NOW** (Summer 2008) *Educational Leadership* 65 (Summer Online Issue)

http://www.ascd.org/publications/educational_leadership/summer08/vol65/num09/toc.aspx

Summary: These two special issues of EL provide numerous suggestions about how to teach students to think deeply about content. Articles by a wide range of respected researchers and educators (including N. Noddings, H. Gardner, M. Brady, A. Costa, D. Perkins and others) address two important questions: 1) How can educators actually teach students to think? & 2) Are most of our current educational practices encouraging students to think – or having the opposite effect?

2. Critical Thinking Handbooks [definitions, professional development, research-based principles, strategies]

Paul, R., Binker, A. Jensen, K., Kreklau, H. (1997) *Critical Thinking Handbook: 4-6th grades: A Guide for Remodelling Lesson Plans in Language Arts, Social Studies & Science*. Rohnert Park, CA: Foundation for Critical Thinking (Series has handbooks for grades K-3, 4-6, 6-9, 9-12.) (Related articles & resources: <http://www.criticalthinking.org/articles/>)

Summary: These handbooks guide K-12 teachers in a process for remodeling their lessons in order to integrate critical thinking across the curriculum.

3. Perspectives in Critical Thinking [equity, curriculum integration] <http://www.questia.com/PM.qst?a=o&d=100609532>

Weil, D. & Anderson, H.K. (2000) *Perspectives in Critical Thinking: Essays by Teachers in Theory and Practice*. NY: Lang.

Summary: This edited volume has many excellent chapters on critical thinking from a critical pedagogy perspective. A theme that runs through the book is a critique of “uncritical critical thinking.” Good examples from different content areas.

4. Howard Gardner on 21st Century Thinking & Learning [research-based principles, examples]

a. **Five Minds for the Future** <http://www.howardgardner.com/books/books.html#FM>

Gardner, H. (2007) *Five Minds for the Future*. Boston, MA: Harvard Business School Press.

Summary: Drawing on decades of cognitive research, and providing many examples, this book outlines the specific cognitive abilities that will be sought and cultivated by leaders in the years ahead: the disciplined mind, the synthesizing mind, the creating mind, the respectful mind, and the ethical mind.

b. **Intelligence reframed: Multiple intelligences for the 21st century** <http://www.pzpublications.com> (& Google Books)

Gardner, H. (1999) *Intelligence Reframed: Multiple Intelligences for the 21st Century*. New York: Basic Books

Summary: Gardner describes how the multiple intelligences theory has evolved and introduces two new intelligences. He explores the relationship among intelligence, creativity and leadership and offers practical guidance to educators.

5. How People Learn: Brain, Mind, Experience, & School [research-based principles] www.nap.edu/html/howpeople1/

Bransford, J., Brown, A., Cocking, R. (2000) *How People Learn: Brain, Mind, Experience, & School* DC: National Academy

Summary: *How People Learn*, published by the National Research Council, synthesizes the research evidence regarding how learning occurs and the optimal conditions to foster learning. For a summary of the findings on reasoning, problem-solving, and metacognition, see the Conclusion (pp. 219-240).

6. Creative Reading Methodology-Alma Flor Ada [framework] <http://www.delsolbooks.com/amagicalencounter.htm>

Ada, A.F. (2002) *A Magical Encounter: Latino Children's Literature in the Classroom* Boston: Allyn & Bacon

Summary: The creative reading methodology (developed by Ada, based on ideas of Freire, and often cited by others interested in critical pedagogy) offers a critical literacy framework that has been used successfully with students of all ages, and shared with parents, to deepen critical questioning and inquiry. Four phases of questioning include: descriptive, personal interpretive, critical/multicultural/anti-bias, and creative/transformational. Summaries are available online at: <http://www.iteachilearn.com/cummins/biliteratempowerment.html> (see the end of the article by Cummins, *Biliteracy, Empowerment, & Transformative Pedagogy*) & <http://www.joanwink.com/scheditems/AFAoverview.pdf>

7. Inquiry-Based Learning [research-based principles] <http://www.edutopia.org/inquiry-project-learning-research>

Barron, B. & Darling-Hammond, L. (2008) Teaching for Meaningful Learning: A Review of Research on Inquiry-Based and Cooperative Learning. In *Powerful Learning: What We Know About Teaching for Understanding*. San Francisco: Jossey-Bass. Chapter can be downloaded at: <http://www.edutopia.org/pdfs/edutopia-teaching-for-meaningful-learning.pdf>

Summary: This review of the research illustrates the benefits and outlines the components of inquiry-based teaching, a student-centered, active learning approach focusing on questioning, critical thinking, and problem-solving.

8. Differentiating with Graphic Organizers [research-based strategies, examples] Preview at <http://books.google.com>

Drapeau, P. (2009) *Differentiating with Graphic Organizers: Tools to Foster Critical & Creative Thinking*. CA: Corwin Press.

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Summary: This research-based resource presents graphic organizers for nine types of thinking processes based on Bloom's taxonomy and offers examples of how to use, create, and modify graphics organizers to help differentiate instruction in different subject areas and grade levels to promote critical and creative thinking.

9. Higher Level Thinking & English Language Learners [strategies] http://www.pdkintl.org/kappan/k_v91/k0911toc.htm

Lundquist, A. & Hill, J. (2009) English Language Learning & Leadership: Putting It All Together, *Phi Delta Kappan* 91 (3)

Summary: This article details one approach for increasing academic rigor for ELLs, and provides a matrix for incorporating higher-order thinking skills into all stages of language acquisition along with ideas for school-level implementation.

10. Critical Skills Program [strategies] http://www.pdkintl.org/kappan/k_v91/k0910toc.htm

Thomas, L., (Oct. 2009) From Experience to Meaning: The Critical Skills Program, *Phi Delta Kappan*, 91(2) 93-96 (Also available at: www.antiochne.edu/directory/docs/pdkCSP.pdf)

Summary: The Critical Skills model integrates four effective teaching methods into a coherent strategy, including a collaborative learning community, experiential learning, problem-based learning, and standards-driven learning. Students seek solutions to a carefully crafted problem that connects the curriculum to its real-world application.

11. Creativity and the Creative Flow - Csikszentmihalyi http://www.ted.com/talks/mihaly_csikszentmihalyi_on_flow.html (2004) [research-based principles] (Last 7 minutes of video shows a chart & explains his theory and research on flow)

Summary: Research psychologist Mihaly Csikszentmihalyi says creativity is a central source of meaning in our lives. He has contributed pioneering work to our understanding of happiness, creativity, human fulfillment and the notion of "flow" – the creative moment and state of heightened focus and immersion in activities such as art, play and work. See also:

- Finding Flow: The Psychology of Engagement with Everyday Life** (1997) NY: Basic Books. For an interview with the author about this book: <http://www.edutopia.org/mihaly-csikszentmihalyi-motivating-people-learn>
- Creativity** (1996) NY: Harper-Collins. Excerpt: <http://www.psychologytoday.com/articles/199607/the-creative-personality>

12. Sir Ken Robinson Edutopia Video (19 minutes) (2006) <http://www.edutopia.org/sir-ken-robinson-creativity-video> <http://www.edutopia.org/sir-ken-robinson-creativity-part-two-video> [principles]

Summary: Creativity expert Sir Ken Robinson makes an entertaining and moving case for creating a school system that nurtures (rather than undermines) creativity. Robinson challenges the way we're educating our children, and champions a radical rethink of our school system, to cultivate creativity and acknowledge multiple types of intelligence. See also:

- Why Creativity Now?** (17 minute video with transcript of interview in Educational Leadership) (see Readings)
- Sir Ken Robinson TED Video** (19 min) http://www.ted.com/talks/ken_robinson_says_schools_kill_creativity.html
- Review of Robinson's video** <http://leading-learning.blogspot.com/2009/01/education-for-creativity.html>
- Commentary by Robinson** <http://www.cnn.com/2009/OPINION/11/03/robinson.schools.stifle.creativity/index.html>
- Sir Ken Robinson's website** <http://www.sirkenrobinson.com/>
- Robinson's book on creativity & education** *The Element: How Finding Your Passion Changes Everything*, 2009

13. Assessment - Defining and Measuring Critical Thinking – Facione [definitions, assessment]

- Critical Thinking: What It Is & Why It Counts** (2010 update) <http://www.insightassessment.com/9articles%20WW.html>
- The Delphi Report** American Philosophical Association (1990) *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction*. http://www.insightassessment.com/pdf_files/DEXadobe.PDF

Summary: The Delphi Report describes the findings of a two year project to articulate an international expert consensus definition of critical thinking, including its core cognitive skills. The experts identify the characteristics of an ideal critical thinker, and present specific recommendations relating to critical thinking instruction and assessment.

14. Bloom's Taxonomy Revised [framework] Anderson, L.W., and D. Krathwohl (Eds.) (2001). *A Taxonomy for Learning, Teaching and Assessing: a Revision of Bloom's Taxonomy of Educational Objectives*. NY: Longman

Summary: Anderson and Krathwohl revised Bloom's taxonomy to make it easier to use for lesson planning, by combining the cognitive process and knowledge dimensions, switching the names of the levels from nouns to active verbs, and reversing the order of the highest two levels: synthesis and evaluation.

15. Bloom's Taxonomy Curriculum Planning Tools [strategies, tools]

- Noble, T. (2004) Integrating the Revised Bloom's Taxonomy With Multiple Intelligences: A Planning Tool for Curriculum Differentiation, *Teachers College Record* 106 (1), 193-211 <http://tonyfiles.wordpress.com/2006/06/Noble%20MI%20tool.pdf>

Summary: This planning tool integrates the revised Bloom's taxonomy with Gardner's theory of multiple intelligences.

- Investigate a Book - Fiction or Non-fiction: <http://www.kurwongbss.eq.edu.au/thinking/MI%20Smarts/smarts.htm>

Summary: This matrix lists activities at all levels of Bloom's Taxonomy from which students can select as they read books.

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Websites

1. Foundation for Critical Thinking <http://www.criticalthinking.org/> & <http://www.criticalthinking.org/articles/index.cfm>

Summary: This non-profit organization offers a wide range of resources to develop fair-minded critical thinking, including research-based articles, links, and lesson ideas for grades K-12. [definitions, research-based articles, resources]

2. Project Zero (PZ) <http://www.pz.harvard.edu/Research/ResearchThink.htm> [tools, research-based strategies]

Summary: The mission of PZ, developed at the Harvard Graduate School of Education, is to understand and enhance learning, thinking, and creativity in the arts, as well as in humanistic and scientific disciplines, at individual and institutional levels. PZ offers several valuable thinking projects with reports, resources and tools. See: the **Visible Thinking Project** <http://www.pz.harvard.edu/vt/>, the **Artful Thinking Project** <http://www.pz.harvard.edu/at>, and the **Patterns of Thinking Project** <http://www.pz.harvard.edu/Research/PatThk.htm>

3. Intel <http://www.intel.com/education/tools/index.htm> [tools, on-line mini-course]

Summary: Intel offers several free teaching resources for promoting thinking in the classroom (including online thinking tools, such as visual maps) and a valuable on-line mini-course/tutorial on project-based approaches to learning: <http://www.intel.com/education/video/pbl/>. Note: For critical thinking and metacognition view Module 5, Lessons 1 & 4.

4. Partnership for 21st Century Skills (P21) <http://p21.org> [definitions, framework, links]

Summary: P21 provides frameworks and resources for teaching 21st century skills. The sections on critical thinking and problem-solving and on creativity and innovation include definitions and links to other sites:

a. **Framework** http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

b. **Thinking** http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=260&Itemid=129

c. **Creativity** http://www.p21.org/index.php?option=com_content&task=view&id=262&Itemid=120

5. Applications of Bloom's Taxonomy to Digital and 21st Century Learning [frameworks, tools, strategies]

a. **Bloom's Digital Taxonomy** <http://edorigami.wikispaces.com/Bloom%27s+and+ICT+tools> Churches, a New Zealand educator, applies Bloom's Taxonomy to the Digital World. See also Churches' article: **Bloom's Taxonomy Blooms Digitally** *Tech & Learning* April 1, 2008 <http://www.techlearning.com/article/8670>

b. **Modifying Bloom's Taxonomy to Meet 21st Century Pedagogies** 7 parts <http://jmajor.midsolutions.org/?p=419>

c. **Critical Thinking in Asynchronous Discussions** http://www.itdl.org/Journal/Jun_05/article02.htm

6. U.S. Patent and Trademark Office (USPTO) Websites for Kids and Teachers [resources, student activities]

USPTO Kids' Pages <http://www.uspto.gov/web/offices/ac/ahrpa/opa/kids/index.html>

Summary: Resources for teachers to inspire students through problem-solving exercises, exploration, creativity and the inventive process, as well as information on intellectual property protections of patents and copyrights.

a. **Invent Now** <http://Inventnow.org> Site for children to engage in games/activities where they use their creativity.

b. **iC@ea™ Curriculum (K-12)** http://www.uspto.gov/web/offices/ac/ahrpa/opa/kids/kid_tm_curriculum.html

c. **Inventive Thinking Curriculum** <http://www.pravel.com/docs/inventive%20thinking.pdf>

7. Other Critical Thinking and Creativity Websites To Explore [definitions, tools, resources, links]

a. **Critical Thinking** <http://www.criticalthinking.net/> (by educator Robert Ennis of the III. Critical Thinking Project)

b. **Creating Minds Creativity Tools** <http://www.creatingminds.org> (by a British businessman)

c. **EVOKE Problem Solving Social Networking Game** <http://www.urgentevoke.com/page/about-powers>

d. **New Horizons Thinking Resources** http://www.newhorizons.org/strategies/thinking/front_thinking.htm

e. **Teacher Tap: Critical & Creative Thinking & Bloom's Taxonomy** <http://eduscapes.com/tap/topic69.htm>

f. **Teacher Development Network** <http://ozpk.tripod.com/000create> & <http://ozpk.tripod.com/insite5.html>

g. **Dialectical Thinking** http://www.saskschools.ca/~psychportal/Psych20/dialectical_reasoning.htm

h. **Georgia's Critical Thinking Skills Program** <http://www.coe.uga.edu/k12/schools/lessons.html>

i. **Encyclopedia of Educational Technology** <http://edweb.sdsu.edu/EET/articles/BloomsLD/>
<http://edweb.sdsu.edu/EET/articles/bloomrev/index.htm>

j. **Australian PPTs** <http://www.pc.maricopa.edu/ctlt/pedagogy/lb/bestpractice/bloomspres.ppt>
<http://www.slideshare.net/nathanr07/thinking-skills-presentation>

k. **PBS Parents' Guide to Promoting Creativity in Children** <http://www.pbs.org/parents/creativity/>

l. **Creative Instruction Links** <http://www.educationreporting.com/article-how-to-uncork-creative-instruction.php>

m. **Creative Thinking** <http://www.creativethinking.net/> (by Michalko: *Thinkertoys: A Handbook of Creativity*)

n. **Professor Leslie Owen Wilson's Website** <http://www.uwsp.edu/education/lwilson/CREATIV/index.htm>